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10/790,298	03/01/2004	Khoi A. Phan	H0266 / AMPD812US	9262
23623 7590 11/17/2008 AMIN, TUROCY & CALVIN, LLP 127 Public Square 57th Floor, Key Tower CLEVELAND, OH 44114				
EXAMINER KALAM, ABUL				
ART UNIT		PAPER NUMBER		
2814				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/790,298

Applicant(s)

PHAN ET AL.

Examiner

Abul Kalam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7, 23, 25, 26 and 32-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 23, 25, 26 and 32-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/808)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 27, 2008, has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In lines 7-8 of claim 34, the limitation of "wherein each of the thermo-electrical structures has a structure of line patterns selected from a group comprising: helix structure, and a spring structure," is unclear because limitation of thermo-electrical structures lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary

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skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1-7, 23, 25-27 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhindsa et al. (US 5,740,016) in view of Saika (6,573,596) and Morris et al. (US 6,230,497).

Regarding claim 1, Dhindsa discloses in fig. 1, a heat regulating device for regulating a heat flow into and out of an integrated circuit semiconductor body comprising: a plurality of thermo-electrical (TE) structures (140), that creates a uniform temperature gradient (col. 4 lines 13-22) across an integrated circuit semiconductor body (120) via heat inducement to and/or dissipation of generated heat away from a portion of the integrated circuit semiconductor body, and at least one layer of a conductive material (160) in contact with the thermo-electrical structure (140) for conducting heat flow; and least one of plurality of the TE has a distribution line patterns wherein each of the thermo-electric structures (140) has a structure of patterns selected from a group comprising: helix structure and a spring structure (fig. 2a).

But, Dhindsa does not explicitly disclose:

a) wherein the thermoelectric structure has a distribution pattern that is a denser towards center of the structure and a less dense towards outer edges of the structure;

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b) wherein the at least one thermoelectric structure is coupled to an associated hot spot; and

c) wherein the heat regulating device is fabricated from a combination of various layers of silicon carbide and diamond.

Regarding the limitation of the distribution pattern density, Dhindsa states that the TE structures 140, figs. 2a-2b, may be arranged in any desired pattern, col. 5, lines 45-50. Furthermore, Saika discloses a heat regulating device, fig. 2, with thermoelectric structures 12, figs. 5, wherein the distribution pattern of the structures is dense towards the center and less dense towards the outer edges of the structure, col. 6, lns. 15-26. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to incorporate the teaching of Saika into the device of Dhindsa, to form the thermoelectric structures in such a density gradient as claimed, for the purpose of improving thermal efficiency.

Regarding, the limitation of the hot spot, Morris teaches a heat regulating device, fig. 3, wherein the thermoelectric structures 38, are coupled to associated hot spots, figs. 4A-4C, col. 5, lns. 53-67, for the purpose of establishing an even temperature level throughout the device, col. 6, lns. 1-7. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to incorporate the teaching of Morris into the device of Dhindsa, to have the thermoelectric structures coupled to the associated hot spots, for the purpose of providing an even and near-uniform distribution of heat across the entire device.

Regarding the limitation, "fabricated from a combination of various layers of silicon carbide and diamond," note that the limitation is drawn to a product by

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process. Furthermore, it has been held that a "product by process" claim is directed to the product per se, no matter how actually made. *In re Thorpe et al.*, 227 USPQ 964, (CAFC, 1985), and the related case law cited therein makes it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process. Also, note that Applicant has not demonstrated any unpredictability or criticality in relation to the use of such materials. Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use silicon carbide and diamond in the device, since such materials are well known and commonly used in heat regulating devices because of their thermally conductive properties.

Regarding claim 2, Dhindsa discloses the heat regulating device wherein the thermo-electrical structure (140) is trough within the body of the layer of the conductive material 160, fig. 1.

Regarding claims 3-5, Dhindsa discloses the heat regulating device further comprising a plurality of the thermo-electrical structures (140) connected form a spreading assembly, fig. 1, wherein the spreading assembly is operatively connected to a heat sink (170), fig. 1, wherein the thermo-electrical structure 140 is a conductive pathway for heat transfer.

Regarding claims 23 and 25-26, Dhindsa discloses the heat regulating device with components (140), embedded into the spreading assembly to manage the heat flow away from and/or into the portion of the semiconductor body of the integrated circuit, fig. 1, wherein the thermo-electrical structure (140) being embedded with measuring device (sensor) to measure various physical

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properties of the portion of the semiconductor body of the integrated circuit, col. 4, Ins. 33-47, fig. 1, wherein the thermo-electrical structure 140 being external element attached to the surface of the heat regulating device, fig. 1.

Regarding claim 32, Dhindsa discloses a heat regulating device wherein the thermo-electrical structure 140 is a composite, col. 3 lines 55-60, composed of a layer having at least one part tailored to a heat-generating characteristic of a portion of the integrated circuit semiconductor body (120), fig. 1.

Regarding claim 33, Dhindsa discloses a heat regulating device at least one thermo-electric structure 140, fig. 1, is integrated with the semiconductor body (120) such that the thermo-electrical structure (140) is positioned in a region of the semiconductor body where a hot spot (IC would generate heat) is anticipated.

Regarding claims 7 and 34, Dhindsa discloses a heat regulating device for regulating a heat flow of an integrated circuit comprising: means (140, fig. 1) for inducing heat into a portion of a semiconductor body of the integrated circuit (120) utilizing a plurality thermo-electric structures (140, fig. 1), or a means (140) for dissipating heat away from the portion of the semiconductor region of a semiconductor body of the integrated circuit (120) utilizing a plurality of thermo-electric structures (140); the heat inducing means and/or heat dissipating means creates a uniform temperature gradient across the semiconductor body (col. 4 lines 13-22); means (160) for conducting heat in contact with the means (140) for inducing heat into or dissipating heat away from the portion of the semiconductor

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body of the integrated circuit (fig. 1); and least one of plurality of the TE has a distribution line patterns, wherein each of the thermo-electric structures (140) has a structure of patterns selected from a group comprising: helix structure and a spring structure (fig. 2a).

But, Dhindsa does not explicitly disclose:

a) wherein the thermoelectric structure has a distribution pattern that is a denser towards center of the structure and a less dense towards outer edges the structure; and

b) wherein the at least one thermoelectric structure is coupled to an associated hot spot; and

c) wherein the heat regulating device is fabricated from a combination of various layers of silicon carbide and diamond.

Regarding the limitation of the distribution pattern density, Dhindsa states that the TE structures 140, figs. 2a-2b, may be arranged in any desired pattern, col. 5, lines 45-50. Furthermore, Saika discloses a heat regulating device, fig. 2, with thermoelectric structures 12, figs. 5, wherein the distribution pattern of the structures is dense towards the center and less dense towards the outer edges of the structure, col. 6, lns. 15-26. At the time the invention was made, it would have been obvious to one of ordinary skill in the art to incorporate the teaching of Saika into the device of Dhindsa, to form the thermoelectric structures in such a density gradient as claimed, for the purpose of improving thermal efficiency.

Regarding, the limitation of the hot spot, Morris teaches a heat regulating device, fig. 3, wherein the thermoelectric structures 38, are coupled to associated

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hot spots, figs. 4A-4C, col. 5, Ins. 53-67, for the purpose of establishing an even temperature level throughout the device, col. 6, Ins. 1-7. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, to incorporate the teaching of Morris into the device of Dhindsa, to have the thermoelectric structures coupled to the associated hot spots, for the purpose of providing an even and near-uniform distribution of heat across the entire device.

Regarding the limitation, "fabricated from a combination of various layers of silicon carbide and diamond," note that the limitation is drawn to a product by process. Furthermore, it has been held that a "product by process" claim is directed to the product per se, no matter how actually made. *In re Thorpe et al.*, 227 USPQ 964, (CAFC, 1985), and the related case law cited therein makes it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process. Also, note that Applicant has not demonstrated any unpredictability or criticality in relation to the use of such materials. Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to use silicon carbide and diamond in the device, since such materials are well known and commonly used in heat regulating devices because of their thermally conductive properties.

Response to Arguments

3. Applicant's arguments filed August 27, 2008, have been fully considered but they are not persuasive.

With respect to the Dhindsa reference, Applicant argues:

"However, as conceded on page 3 of the Final Office Action dated June 16, 2008, Dhindsa, et al. does not teach or suggest a specific structure for each thermoelectric

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structure such as helix structure and a spring structure of line pattern as recited in independent claim 1. A broad assertion that a plurality of thermoelectric modules can be arranged in any particular manner cannot teach a specific form for an individual thermoelectric structure such as helix structure and a spring structure of line pattern as recited in the subject claims."

First of all, note that in the Final Office Action dated June 16, 2008, the Office did not concede that "Dhindsa, et al. does not teach or suggest a specific structure for each thermoelectric structure such as helix structure and a spring structure of line pattern," as argued by the Applicant. Furthermore, Dhindsa does teach a thermoelectric structure comprising one of a helix structure and spring structure of line pattern (fig. 2a).

With respect to Applicants arguments regarding the limitation of "a heat regulating device fabricated from a combination of various layers of silicon carbide and diamond," note that such a limitation is drawn to a product by process. Furthermore, materials such as silicon carbide and diamond are well known and typically used in heat regulating devices. And finally, note that Applicant has not provided any evidence of unpredictability or criticality in using such materials to fabricate the device.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abul Kalam whose telephone number is (571)272-8346. The examiner can normally be reached on Monday - Friday, 9 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 571-272-1705. The

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fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K./
Examiner, Art Unit 2814

/Phat X. Cao/
Primary Examiner, Art Unit 2814